

WHAT IS BEING CLAIMED IS:

1. A method for bulk separation of single-walled tubular fullerenes based on helicity, comprising the steps of:

providing a plurality of single-walled tubular fullerenes;

5 providing a substrate having a lattice structure;

flowing said plurality of single-walled tubular fullerenes on said substrate at a predetermined angle with respect to an axis of said lattice structure of said substrate, wherein single-walled tubular fullerenes of a predetermined helicity are attracted and held to said substrate; and,

10 removing said single-walled tubular fullerenes held to said substrate therefrom.

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2. The method as recited in Claim 1, wherein the step of flowing is preceded by the step of dissolving at least a portion of said plurality of single-walled tubular fullerenes in a fluid.

5 3. The method as recited in Claim 1, wherein the step of flowing is preceded by the step of suspending at least a portion of said plurality of single-walled tubular fullerenes in a fluid.

10 4. The method as recited in Claim 1, wherein the step of flowing includes the step of aligning longitudinal axes of said plurality of single-walled tubular fullerenes with a direction of flow thereof.

15 5. The method as recited in Claim 2, wherein the step of flowing includes the step of aligning longitudinal axes of said plurality of single-walled tubular fullerenes with a direction of flow thereof.

6. The method as recited in Claim 3, wherein the step of flowing includes the step of aligning longitudinal axes of said plurality of single-walled tubular fullerenes with a direction of flow of said fluid.

5 7. The method as recited in Claim 6, wherein the step of aligning includes the step of forming a confinement-based alignment through at least one outlet passage.

10 8. The method as recited in Claim 7, wherein said at least one outlet passage has a diameter less than one thousand times greater than a diameter of said single-walled tubular fullerenes.

15 9. The method as recited in Claim 6, wherein the step of aligning includes the step of forming an extensional flow through at least one outlet passage.

10. The method as recited in Claim 9, wherein the step of forming an extensional flow includes the step of forming a constriction region within said outlet passage.

5 11. The method as recited in Claim 10, wherein the step of forming a constriction region includes the step of forming said outlet passage with an open bottom juxtaposed on said substrate to define a closed contour passage.

10 12. The method as recited in Claim 1, wherein the step of providing a plurality of single-walled tubular fullerenes includes the step of functionalizing said plurality of single-walled tubular fullerenes with molecular groups having one of a high electric or magnetic susceptibility.

15 13. The method as recited in Claim 12, wherein the step of flowing includes the step of aligning longitudinal axes of said plurality of single-walled tubular fullerenes with a direction of flow of said fluid using at least one electric or magnetic field directed across said fluid flow.

14. The method as recited in Claim 5, wherein the step of aligning includes the step of forming extensional flow through at least one outlet passage.

5 15. The method as recited in Claim 14, wherein said step of forming an extensional flow includes the step of forming a constriction region within said outlet passage.

10 16. The method as recited in Claim 15, wherein the step of forming a constriction region includes the step of forming said outlet passage with an open bottom juxtaposed on said substrate to define a closed contour passage.

15 17. The method as recited in Claim 1, wherein the step of flowing is preceded by the step of suspending said plurality of single-walled tubular fullerenes in a liquid crystal material.

18. The method as recited in Claim 1, wherein the step of flowing is preceded by the step of providing an outlet passage with an open bottom juxtaposed on said substrate to thereby form a closed contour passage.

19. A system for bulk separation of single-walled tubular fullerenes based on helicity, comprising:

a container of a fluid bearing single-walled tubular fullerenes, said single-walled tubular fullerenes each having a longitudinal axis;

5 a dispensing assembly having at least one outlet for discharging said single-walled tubular fullerenes in a flow and at least one inlet coupled in fluid communication with said container;

a substrate having a lattice structure, said lattice structure of said substrate having a selected axis disposed in a predetermined angular  
10 relationship with respect to said flow from said at least one outlet of said dispensing assembly, wherein single-walled tubular fullerenes of a predetermined helicity flowing over said substrate are attracted and held thereto; and,

a drainage assembly disposed adjacent to said substrate for carrying off any of said fluid bearing single-walled tubular fullerenes not held on  
15 said substrate.

20. The system as recited in Claim 19, wherein said dispensing assembly includes means for aligning said longitudinal axes of said single-walled tubular fullerenes in said flow.

5 21. The system as recited in Claim 20, wherein said alignment means includes at least one outlet passage disposed in fluid communication with said at least one outlet of said dispensing assembly, said at least one outlet passage being adapted to form a confinement-based alignment therethrough.

10 22. The system as recited in Claim 21, wherein said at least one outlet passage has a diameter less than one thousand times greater than a diameter of said single-walled tubular fullerenes.

15 23. The system as recited in Claim 20, further comprising a container of a liquid crystal material, said alignment means including means for combining said single-walled tubular fullerenes with said liquid crystal material to suspend said single-walled tubular fullerenes therein, said suspension being flowed over said substrate.

24. The system as recited in Claim 19, wherein said at least one outlet of said dispensing assembly is defined by an outlet passage with an open bottom juxtaposed on said substrate.

5           25. The system as recited in Claim 20, wherein said alignment means includes an emission system in proximity to at least one outlet passage disposed in fluid communication with said at least one outlet of said dispensing assembly, said emission system exposing said fluid bearing single-walled tubular fullerenes to one of a magnetic field or an electric field to align said longitudinal axes of  
10 said single-walled tubular fullerenes with said flow.

26. The system as recited in Claim 19, further comprising a turntable for displaceably supporting said substrate.